UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,370	07/05/2006	Fusheng Xie	AWUPCT122305-04-PAT16	3903

51945 7590 04/29/2008

ANNA WU
P.O. BOX 93286
CITY OF INDUSTRY, CA 91715

EXAMINER	
SINGH, PREM C	
ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
04/29/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,370	XIE, FUSHENG	
	Examiner	Art Unit	
	PREM C. SINGH	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it has some Chinese characters citing figure 1 and figure 2, captions (1. Feed------etc). Abstract should be only in one paragraph, with correct spelling and sentence(s) and every thing else after -- "good quality and high yield"-- should be deleted.

Correction is required. See MPEP § 608.01(b).

Claim Objections

2. Claim 1 is objected to because of the following informalities:

Claim 1 (1) (line 4): The box sign should be replaced by ^{o}C.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US Patent 4,175,211) in view of Stankevitch (US 2003/0047437 A1) and Zhou et (US Patent 5,744,668) and further in view of Applicant's Admitted Prior Art.

6. With respect to claim 1, Chen discloses a process for producing gasoline, kerosene, and diesel oil from waste plastic and rubber (See figure 1 and column 2, lines 1-20). The process comprises:

(1) Catalytically cracking waste plastic and waste rubber in the presence of petroleum oil at a cracking temperature of about 850°F (454°C) (See column 2, lines 3-20; column 6, lines 24-26). It is to be noted that petroleum oil encompasses machine oil.

Chen invention does not specifically disclose adding quartz and sand into the waste raw material.

Chen invention does not specifically disclose steps (2) –(4) of catalytically cracking the gas fraction, filtering, and treating different distillate fractions, however, the invention does disclose separation of cracked effluents from step (1) and producing

gasoline, kerosene, and diesel along with light gases (See figure 1 and column 6, lines 34-49).

Stankevitch discloses a process similar to Chen for converting waste plastic and rubber into hydrocarbon oils in a fluidized bed pyrolysis reactor under similar operating conditions (See page 2, paragraph 0031; page 3, paragraph 0032). Stankevitch also discloses that grainy inert materials like quartz and sand are used for making a fluidized bed. This material can be used as a circulating heat carrier (See page 1, paragraph 0005; page 2, paragraph 0015).

Zhou invention discloses a process similar to Chen for producing gasoline and diesel by using waste rubber and plastic under similar operating conditions (See column 3, lines 5-17). Zhou also discloses that the gases from the cracking (pyrolysis) reactor are take to a fixed bed reactor, gotten rid of sulfur, nitrogen, and chlorine compounds, most of acidic gases and odoriferous gases, and simultaneously, the primary reaction of catalytic cracking proceeds (See column 2, lines 21-26; column 3, lines 23-34). Zhou uses a cracking catalyst comprising ZSM-5 (which is a 5Å molecular sieve) (See column 4, lines 53-54). Although Zhou invention does not specifically disclose the other claimed packing material(s) in the fixed bed reactor in steps (2) and (3), it is expected that the invention should necessarily be using similar packing materials as claimed because the invention is removing sulfur, nitrogen, acidic, and odoriferous gases.

Zhou invention further discloses passing the cracked gases to fractionation and collecting gasoline and diesel fractions (See column 3, lines 49-67; column 4, lines 1-3). It is to be noted that Zhou collects gasoline in storage tank (18) after passing through

separation device (16) and diesel in storage tank (17) after passing through separation device (15) (See figure 1). Although Zhou does not specifically disclose collecting kerosene, it is known to those skilled in the art that separators (15 and 16) must be producing kerosene fractions, because kerosene has a boiling range between gasoline and diesel.

Although Zhou invention does not specifically disclose treating fractions of gasoline, kerosene, and diesel oils, however, the invention does disclose devices (8) and (9) to remove acidic and odoriferous gases from the cracked gases. Thus, one skilled in the art would treat gasoline, kerosene, and diesel fractions by passing through devices (8) and (9) to enhance their quality by further reducing acidic and odoriferous gases.

It is to be noted that the Applicant's admitted prior art also discloses, "The process of catalytic cracking and adsorbing in the fixed bed are based on those in the prior art" (See specification, page 2 , paragraph 2).

Since Chen is producing cracked products including about 12% C_3- gases (See column 10, lines 64-68), it would have been obvious to one skilled in the art at the time the invention was made to modify Chen invention, by adding quartz and sand as disclosed by Stankevitch to improve mixing and heat transfer in the fluidized bed and crack the resulting gases, obtained from the fluidized bed cracking of waste plastic, rubber, and petroleum oil, in a fixed bed reactor as disclosed by Zhou and by the Applicant's admitted prior art. This integrated process will enhance the production of high quality gasoline, kerosene and diesel fractions from waste plastics and rubbers.

7. With respect to claim 2, Stankevitch invention does not specifically disclose amount of quartz and sand in the feed, however, the invention does disclose particle size, density and residence time in the reactor (See Examples 1, 2 and 3, page 5). Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Stankevitch invention and specify the amount of sand and quartz for proper heat balance in the process.

8. With respect to claim 3, Chen invention discloses that feed streams are mixed and maintained at a temperature within a range of 500-700^{o}F for a sufficient time (See column 5, lines 60-63). Chen further discloses that the reactor temperature is about 850^{o}F (See column 6, lines 24-26). This implies that the cracking temperature in step (1) is gradually increased.

9. With respect to claim 4, Zhou invention does not specifically disclose the addition of claimed substance during fractionation, however, the invention does disclose addition of NaOH or KOH to remove acidic and odoriferous gases from cracked feedstock. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Zhou invention and add an alkali/alkaline material, including the claimed mixture of cobaltic phthalocyanin sulfonate, NaOH and H_2O_2, during fractionation for further removal of acidic and odoriferous impurities. It is expected that the claimed mixture will further improve the quality of distillates because H_2O_2 is a known agent to improve color of hydrocarbons.

10. With respect to claim 5, Zhou invention discloses the boiling range for gasoline from 64 to 185°C and for diesel from 176 to 290°C (See column 7, Table 3). It is known to those skilled in the art that kerosene has a boiling range in between gasoline and diesel.

11. With respect to claim 6, Zhou invention discloses that gasoline fraction is introduced into condenser (14) from the top of fractionating column (25) and enters a gasoline storage tank (18) through separation facility (16) for removing oil and water (See column 3, lines 63-66).

Zhou invention does not specifically disclose the temperature range, however, the invention does disclose that the cracking product is condensed in condenser (19) and cooled to room temperature (See column 3, lines 49-51).

Zhou invention does not disclose treatment of gasoline fraction with active kaolin.

Stankevitch invention discloses that if the waste plastics comprise chlorinated polymers, for example PVC, the hydrogen chloride produced in the cracking process should be recovered in a packed bed adsorber of a proper grainy adsorbent, for example calcium oxide (See page 2, paragraph 0017). Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the integrated Chen, Stankevitch, and Zhou process by adding kaolin in the adsorber for chloride removal, because calcium oxide and kaolin, both are expected to be functionally similar.

12. With respect to claim 7, Zhou invention discloses that the liquid oil mix in the buffer vessel (21) is treated with sulfuric acid (See column 3, lines 58-60). Zhou also discloses that the cetane ratio of diesel is 45-60 (See column 5, lines 20-21).

Zhou invention does not specifically disclose acid strength and amount, alkali treatment and cetane additive.

It is known to those skilled in the art that sulfuric acid typically used in the process is 98%.

It would have been obvious to one skilled in the art at the time the invention was made to treat the acid treated diesel with an alkali, like NaOH to neutralize the acidity caused by sulfuric acid. It would also have been obvious to use acid and alkali in appropriate amounts, including as claimed, to properly remove impurities and neutralize the finished diesel.

Diesel produced in Zhou process has a cetane ratio of 45-60, which can be improved by adding additives, for example alkyl nitrates which are known in the art. It is also evidenced by web pages (Attached).

13. With respect to claims 8-10, Chen invention discloses that waste plastics and rubbers in presence of petroleum oil are used for producing gasoline, kerosene, and diesel and the cracking in step (1) is at a temperature of 850^{o}F (454^{o}C) (See column 2, lines 3-20; column 6, lines 24-26).

Chen invention does not specifically disclose machine oil, however, the invention does disclose use of high boiling petroleum derived streams such as FCC bottoms,

TCC syntower bottoms, coker gas oil, heavy cycle oil, light cycle oil slurry oil, coal tar, and mixtures thereof (See column 3, lines 34-58). It is expected that the streams disclosed by Chen will be functionally similar to machine oil.

14. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US Patent 4,175,211) in view of Zhou et (US Patent 5,744,668).

15. With respect to claim 11, Chen invention discloses a device for producing gasoline, kerosene, and diesel oil from waste plastic and rubber comprising a cracker (See figure 1 and column 5, lines 44-68; column 6, lines 1-60).

Chen invention does not disclose a fixed bed, a packed tower, and a fractionating tower with claimed components.

Zhou invention discloses a device for producing gasoline, kerosene, and diesel oil from waste plastic and rubber similar to Chen comprising fixed bed catalytic cracker (device 9), packed bed (device 8) and fractionation column (device 25) (See figure 1 and column 2, lines 63-67; column 3, lines 1-2;). Zhou discloses the details of device (25) and attached accessories (devices 11-18).

Zhou device does not specifically disclose kerosene treating column connected with a filter and product tank in series, however, the setup does disclose gasoline and diesel treating columns connected with a filter (separator) and product tank in series. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Chen invention and add a fixed bed, a packed tower, and a fractionating

tower, as disclosed in Zhou invention, for an integrated setup to catalytically crack waste plastics and rubbers to produce gasoline and diesel fractions. It would also have been obvious to add a device similar to gasoline and diesel devices for kerosene. Connection of top portion of fractionator with a quencher via a tube, quencher connecting to a condenser and condenser linking to a separator of oil and water, are routine devices known to those skilled in the art.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Comolli et al (US Patent 6,190,542).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PREM C. SINGH whose telephone number is (571)272-6381. The examiner can normally be reached on 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PS041008

/In Suk Bullock/
Examiner, Art Unit 1797